4x4 Calculators

Crawl Ratio (Manual)

Transmission 1st Gear Ratio	3.52
Transfer-Case Low Gear Ratio	4
Axle Gear Ratio	3.54
Crawl Ratio	**49.8**

Crawl ratio is an indicator of your slowest speed when traveling in 1st gear, low-range. The higher the number, the slower you'll be able to crawl over difficult obstacles, resulting in better vehicle control.

1st Gear Ratio x Low-Range Ratio x Axle Gear Ratio = Crawl Ratio

Crawl Ratio (Automatic)

Crawl Ratio	49.8
Torque Converter Reduction Factor	1.3
Approximated Crawl Ratio	**64.8**

If you have an automatic transmission, the torque converter will effectively multiply your torque, slightly increasing your "approximated" crawl ratio.

Crawl Ratio x 1.3 = Approximated Crawl Ratio

Cruising RPM

MPH Desired	65
Tire Diameter	33
Transmission Final Gear Ratio	1
Transfer-Case High Gear Ratio	1
Axle Gear Ratio	3.54
Cruising RPM	**2342.8**

Using this equation, you can determine your engine RPM at highway speeds. Enter your desired MPH, tire diameter, and transmission, transfer-case, and axle gear ratios. This can be helpful when planning a build-up on a daily driver.

$$\frac{\text{MPH x Trans Gear Ratio x High Gear Ratio x Axle Gear Ratio x 336}}{\text{Tire Diameter}} = \text{Cruising RPM}$$

MPH

RPM	2342
Tire Diameter	33
Transmission Final Gear Ratio	1
Transfer-Case High Gear Ratio	1
Axle Gear Ratio	3.54
MPH	**65.0**

Using the same basic equation parameters (as above), you can determine your MPH by entering the remaining values.

$$\frac{\text{RPM x Tire Diameter x Trans Gear Ratio x High Gear Ratio}}{\text{Axle Gear Ratio x 336}} = \text{MPH}$$

Tire Diameter

MPH	65
RPM	2342
Transmission Final Gear Ratio	1
Transfer-Case High Gear Ratio	1
Axle Gear Ratio	3.54
Tire Diameter	**33.0**

Using the same basic equation parameters (as above), you can determine your tire diameter by entering the remaining values.

$$\frac{\text{MPH x Trans Gear Ratio x High Gear Ratio x Axle Gear Ratio x 336}}{\text{RPM}} = \text{Tire Diameter}$$

Axle Gear Ratio

MPH	65
RPM	2342
Transmission Final Gear Ratio	1
Transfer-Case High Gear Ratio	1
Tire Diameter	33
Axle Gear Ratio	**3.54**

If the tag on your differential is missing, you don't have your vehicle's original paperwork, or your 4x4 has non-OEM components, it can be tough to determine your axle ratio (without tearing down your diff and counting the gear teeth!), especially on older or rare 4x4s. This won't give you an exact ratio, but it will get you close enough for a match to the axle manufacturer's gear offerings.

$$\frac{\text{RPM x Trans Gear Ratio x High Gear Ratio x Tire Diameter}}{\text{MPH x 336}} = \text{Axle Gear Ratio}$$

Actual Speed (with Tire Size Change)

New Tire Diameter	31
Old Tire Diameter	28
Indicated Speed	65
Actual Speed	**72.0**

When you change the diameter of your tires, your speedometer will no longer be accurate. Use this calculator to determine your actual speed based on the old and new tire diameters and the indicated speed.

$$\frac{\text{New Tire Diameter} \times \text{Indicated Speed}}{\text{Old Tire Diameter}} = \text{Actual Speed}$$

Effective (Approximated) Axle Gear Ratio With Tire Size Increase

New Tire Diameter	31
Old Tire Diameter	28
Axle Gear Ratio	3.55
Effective Axle Gear Ratio	**3.21**

When you increase the diameter of your tires, it's effectively like installing higher (numerically lower) axle gearing, robbing your 4x4 of power. Use this equation to determine the impact larger tires will have on your effective gear ratio.

$$\frac{\text{Old Tire Diameter} \times \text{Axle Gear Ratio}}{\text{New Tire Diameter}} = \text{Effective Axle Gear Ratio}$$

Effective (Approximated) Axle Gear Ratio With Tire Size Decrease

New Tire Diameter	31
Old Tire Diameter	28
Axle Gear Ratio	3.55
Effective Axle Gear Ratio	**3.93**

Using the same basic equation parameters (as above), you can determine the effect of smaller tires on effective gear ratio.

$$\frac{\text{New Tire Diameter} \times \text{Axle Gear Ratio}}{\text{Old Tire Diameter}} = \text{Effective Axle Gear Ratio}$$

Calculating Horsepower

Torque	225
RPM	2200
Horsepower	**94.2**

If you know your engine's torque rating at a specific RPM, you can use this formula to calculate its horsepower rating at the same RPM.

$$\frac{\text{Torque} \times \text{RPM}}{5252} = \text{Horsepower}$$

Calculating Torque

Horsepower	195
RPM	4500
Torque	**227.6**

If you know your engine's horsepower rating at a specific RPM, you can use this formula to calculate its torque rating at the same RPM.

$$\frac{5252 \times \text{Horsepower}}{\text{RPM}} = \text{Torque}$$

Calculating Horsepower Loss at Elevation

Horsepower	195
Elevation (ft.)	14000
Horsepower Loss	**81.9**

When four-wheeling on high mountain trails, your engine's power output will decrease proportionately to the rise in elevation. (This applies only to naturally aspirated engines.) Use this equation to calculate your engine's horsepower loss.

$$\frac{\text{Horsepower} \times \text{Elevation} \times 0.03}{1000} = \text{Horsepower Loss}$$

SAE vs. Metric Conversions

Convert From	Convert To	Formula	Value	Conversion
Centimeters	Inches	x .3937	12	**4.72**
Cubic CM	Cubic Inches	x 6.102 x .01	4200	**256.28**
Cubic Inches	Liters	x 1.639 x .01	488	**8.00**
Inches	Centimeters	x 2.54	5	**12.70**
Inches	Millimeters	x 25.4	20	**508.00**
Kilometers	Miles	x .6214	25	**15.54**
Miles	Kilometers	x 1.609	120	**193.08**
Liters	Gallons	x .2642	35	**9.25**